A field study on the behaviour of two roadside groups of Rhesus Macaque [*Macaca mulatta* (Zimmermann)] in northern Uttar Pradesh

BY

R. P. MUKHERJEE

Zoological Survey of India, Calcutta

(*With two text-figures*)

This paper presents information about the group size, group composition, range, feeding and drinking habits, grooming, play, chase, threat and contact, sexual behaviour, attitude towards infants, behaviour of a peripheral male and formation of a sub-group of two roadside groups of rhesus macaques.

INTRODUCTION

In 1964 and 1965 the author conducted surveys, along with a team of the Johns Hopkins University under the leadership of Dr. C. H. Southwick, of northern Uttar Pradesh, Delhi, and parts of the Punjab, to study the abundance, group composition and group size of the Rhesus Macaques. In addition certain forest areas in the Kumaon region were also investigated. This paper presents the result of studies conducted by the author on two roadside groups of Rhesus Macaques near Bareilly in northern Uttar Pradesh, based on observations made during the field studies.

During the survey of 1964 two large groups of the macaques were observed at the side of the main road near two villages located very close to each other at Bareilly, U.P. Though found near villages, their main habitat was the roadside and they were classified as roadside groups. For convenience the two groups are named after two villages. In the year 1965 an attempt was made to collect as much data as possible on the behaviour of these two groups. The information based on the observations made from April to June, 1965, is incorporated in this paper.

The two villages, Karghena and Kareilly are about half a kilometre apart, situated on the Bareilly-Mathura main road, about nine kilo-

metres south of Bareilly. The first group was near Karghena Village and the second about 0·2 kilometre south of the first group and near the second village. The trees on the two sides of the road were mostly mango (*Mangifera indica*), ' pakar ' (*Ficus wightiana*) and ' neem ' (*Azadirachta indica*). The trees were nearer to the Kareilly group than the Karghena group.

Group size and group composition

The group size of macaques near Karghena Village as counted in December, 1964, was 33 and the group size near Kareilly Village was 30. The two groups when counted in the months of April to June, 1965, showed a total of 36 monkeys each. The details of the group composition and group size of the two groups are given in Table 1. In 1965

Table 1

Group composition

Years		Kareilly					Karghena				
		Adult males	Adult females	Juveniles	Infants	Total	Adult males	Adult females	Juveniles	Infants	Total
1964	..	6	6	12	6	30	4	7	15	7	33
1965	..	6	8	15	7	36	4	8	17	7	36

out of the 7 infants of the Karghena group 3 were newly born and there was a peripheral male in this group. Similarly out of the 7 infants of the Kareilly group 6 were newly born. During the second survey both groups were equal in numbers and had also increased in number. However, the increase in the second group was more than in the first. In these two groups the juveniles were more in numbers, although in other groups observed during the survey, it was noticed that numbers of juveniles were less. This indicates that these two groups had escaped trapping and molestation.

During the second survey most of the females carried new born infants. One pregnant female of the Kareilly group carried a deep wound on her left thigh and she died after a few days.

Range

The groups retired for the night just before darkness sets in. The members of the Karghena group selected a big pakar tree (*Ficus wightiana*), or the roof of a permanent store house located just below this tree, for roosting. During the day also members of the troop rested, slept or groomed at these places. During the day each group moved, fed and rested as a unit. They remained close to each other most of the time. Almost all the members of both groups came down from the place of their resting near or on the road in the early morning. Their daily stereotyped movements were mainly influenced by the location of the food. Chance (1956), while working on a captive group, also observed that the movements of the animals in his group were to some extent dependent on the availability of the food. During movement sufficient numbers of animals moved together as a unit. Such type of movement was also reported by Southwick (1962) in his temple groups. Animals of the Karghena group rarely moved to the eastern side into the villages in search of food. But they very often visited the fields in the eastern and western sides in search of food. The Karghena group made frequent trips for mangoes into a mango orchard located on the north-western side, but usually they were soon chased out by villagers. Members of both groups never moved deep into the villages or the fields. The Karghena group did not move much down to the southern side and the Kareilly group to the northern side of their normal habitat. Thus the two groups tried to avoid each other (Fig. 2). This was also observed by Southwick (1962) in temple groups, although he found extensive overlapping of home ranges in the temple groups. At times the peripheral male of the Karghena group moved about half a kilometre away to the north of the main group and near to another village—Nekpur. Usually the movements of both groups were restricted to their normal habitat.

Members of both groups were very active during the morning and evening hours and the maximum movements were observed during these periods. They either moved along the main road or on the sides and often made trips into the fields or jumped from tree to tree. With the rise of day temperature their activities slowed down and between 10 a.m. and 5 p.m., they were mostly observed resting, sleeping or grooming under the shade or on the low, thick branches of trees. Bernstein & Mason (1963) also noticed that the resting increased with the increase in temperature. They have reported that the animals in their captive colony spent more time at greater height with the rise in temperature.

The members of the Kareilly group rested, groomed, or slept on different trees lining the sides of the road (Fig. 1). While most members of the first group shared a single tree, the members of the second group used more than one tree for their resting, sleeping and grooming.

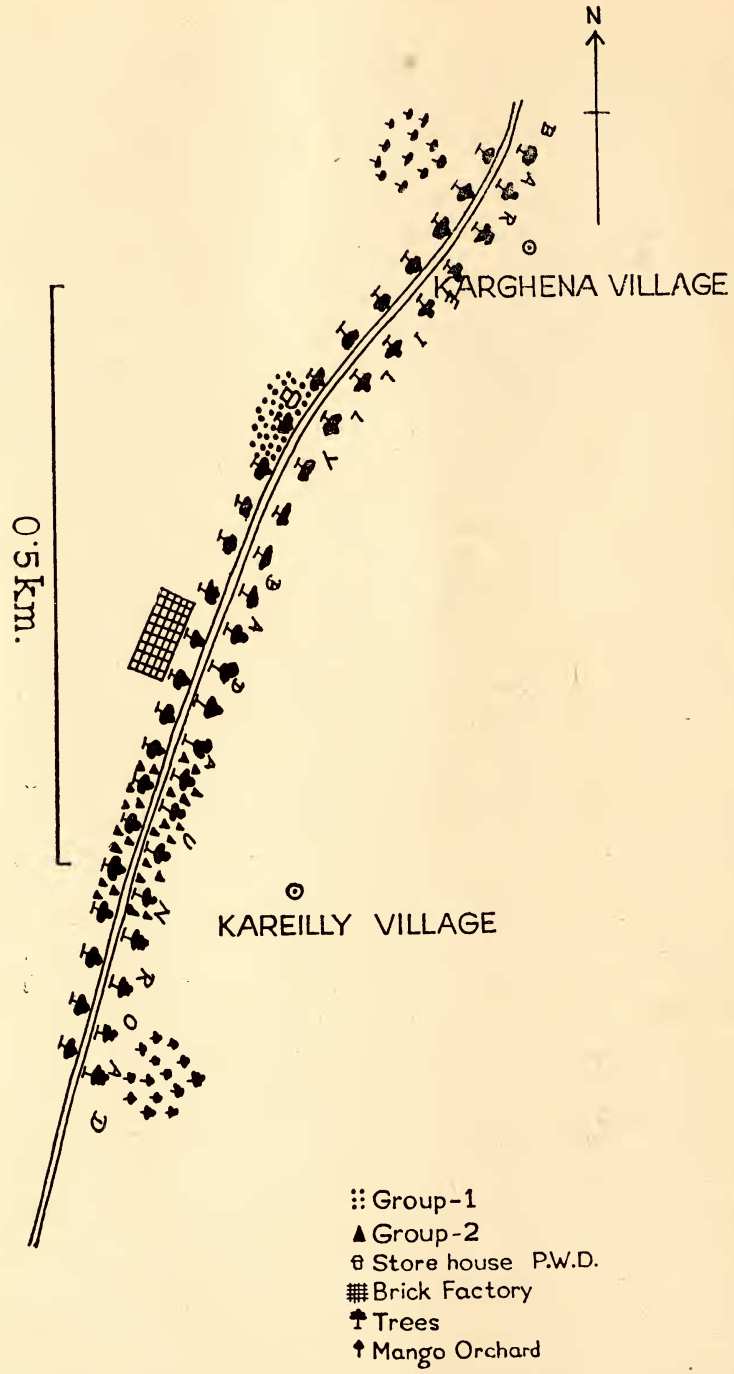

Fig. 1. Typical night-time lodging and retiring positions after morning activities of the two groups of rhesus macaques.

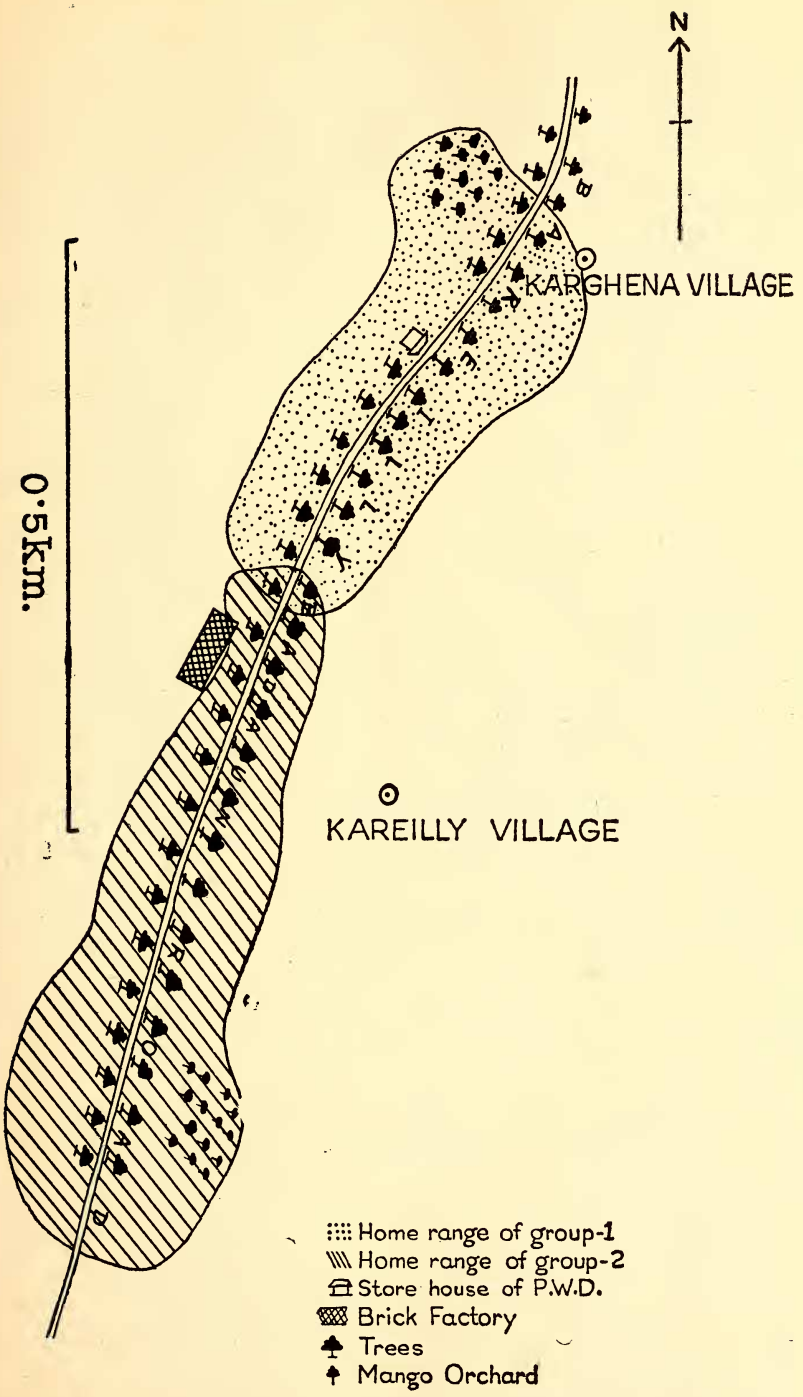

Fig. 2. Home range of two groups of rhesus macaques.

Habits and behaviour

Feeding and drinking : The main food consisted of tender leaves of mango, pakar and neem trees, mango fruits, grass or food grains left over in the village fields, scattered from loaded trucks or passing bullock carts. They preferred mango and pakar leaves more than the neem leaves. Insects also formed a part of their food. They were occasionally fed by passing villagers with grains, peanuts and fruits.

One adult male, an adult female and a juvenile of the Karghena group and an adult female of the Kareilly group very often rubbed the food with their two hands before putting it into the mouth.

A juvenile of the Kareilly group often carried food, holding it in the left foot, and on such occasions appeared as a lame animal.

The members of the two groups drank the stagnant water in the road-side ditches, usually visiting the ditches in groups, after an active morning and twice or thrice during the day and finally before retiring.

Grooming : Grooming was very common when the animals were at rest ; usually one animal was groomed by the other and often in groups of three to four. The adult females with new born infants remained close to each other while resting, sleeping or grooming.

Playing : Play was common among juveniles as they were the most active members in a group. Juveniles usually played when the adults were either resting or grooming. The juveniles played among themselves but were also noticed to play with a stick, a piece of paper, a piece of rope or a piece of cloth. Whenever their play became rough it ended in a short chase or a threat. Juveniles were also very fond of playing with infants and these were also observed playing among themselves. The infants at times also played with their mother's tail. During the period of observation, only on one occasion a dominant male was noticed to play with a juvenile.

Chase, threat and contact : Most of the agonistic behaviour was seen during feeding time and those involved were mostly adult females and juveniles. The adult males took less interest in such activities. Bernstein & Mason (1963) also reported the increase in the incidence of aggressive activities in their group during feeding time. Chance (1956), however, observed that adult males were also involved in threat, chase and contact.

When juveniles occasionally played roughly with infants and these began to cry, the mothers at once rushed to help and chased off the juveniles. At times adult males, particularly the dominant males, also rushed to help the infants and chased off the juveniles. The chase by one member could be for a short or long distance.

Adult females with infants gave more threats, chased and fought than the unaccompanied females. Whenever there was a hot chase

among the members of a group, the dominant male intervened and settled the issue by chasing away the fighting members. In a hot chase or in a severe bite the defending animal was found usually either to urinate or to defecate due to fear.

No member of the two groups showed any agonistic behaviour towards infants ; rather the latter were treated with much care and affection by other members of the group. Sometimes during fights an animal slapped or pulled the body hairs of the other.

In case of a chase by villagers or by village dogs all the animals at once climbed up the nearest tree and the adult males in such circumstances defended the colony by giving threats to the attacking villagers or village dogs. In such cases the adult females with infants hurriedly collected their infants before climbing the trees, such females at times also joined the males in defending the group. Sometimes when the source of trouble was invisible, or at a considerable distance, the animals stood upon their legs to locate the source.

A fight between members of the two groups was never observed and both groups tried to avoid each other. However, villagers reported that at times the two groups engaged in severe fighting. Intergroup fights were very common in temple groups as reported by Southwick (1962). The agonistic behaviour of the two groups for a period of 35 hours is presented in Table 2.

TABLE 2

AGONISTIC BEHAVIOUR OF RHESUS MACAQUES DURING 35 HOURS OF OBSERVATION

	Total No. of threats	Total No. of chases	Total No. of Aggressive contacts
Dominant males with other males	—	5	—
Adult males with Adult females	18	21	5
Adult males with Juveniles	38	25	6
Adult females within themselves	25	16	6
Adult females with Adult males except dominant males	6	8	1
Adult females with Juveniles	91	58	7
Adult females with Infants	1	—	—
Juveniles with Adult males except dominant males	2	—	—
Juveniles with Adult females	6	1	1
Juveniles among themselves	53	31	15

From the Table it is apparent that adult males and females directed their maximum threats to juveniles and the juveniles also gave maximum threats to other juveniles. Similarly the chasing by the adult males, females and juveniles were directed towards the juveniles and the maximum contacts were recorded among the juveniles themselves. Adult males next to juveniles directed their threats, chase and contacts to adult females. Similarly the adult females next to juveniles directed their agonistic behaviour towards other females.

Sexual behaviour : Not much was observed about the sexual behaviour of the groups. None of them was breeding at that time. Some of the adult females were carrying infants, and some others were apparently in an advanced stage of pregnancy.

Behaviour of the members of a group towards infants : As mentioned earlier the infants were treated with much care and affection by all members of the two groups studied. The behaviour of the dominant males towards the infants was interesting. The dominant male allowed infants to climb on his hands, legs, back or head when he was resting. The infants approached the dominant male without any fear. In such cases the mothers of the infants usually approached the male and collected the infants from him, or after spending some time with the male they came back to their mothers. Once it was observed that an infant of the Kareilly group while playing with a juvenile cried for help and as the dominant male was feeding very close to this infant, he at once responded and rushed to the help of the infant. He chased out the juvenile and picked up and held the infant against his chest like the mother and carried the infant in this position to some distance and began to eat again. The infant after some time climbed on the back of the dominant male and remained there till the mother came and collected it. On a number of occasions it was also observed that the dominant male held the infants against his chest till either the infants themselves ran away or the mothers collected them from the male. Once an infant of the Kareilly group suddenly climbed on the back of a moving dominant male and the male carried the infant to some distance then stopped and gently tried to push off the infant from his back. Finally the infant jumped off and ran to its mother. It is, therefore, clear that the dominant males also take interest in infants.

The behaviour of a young female of the Kareilly group towards infants was also very interesting. The female was so fond of infants that whenever she got a chance she grabbed and picked up one. This was only possible when the mother was away from the infant, busy feeding, grooming or resting. In such cases she picked up the infant and held her against her chest or started to play or allowed the infant to sit on her back. She behaved like a normal mother. The mother usually rushed for the infant and the young female in such cases either

left the infant and ran away or she dragged it for some distance before finally leaving it. At times the dominant male also directed threats or chased the young female when the infant cried. This female was so much attached to infants that when other members of the group were busy in other activities this female was usually with an infant. It is possible that she had lost her own infant.

One female of the Kareilly group also carried a dead infant for a number of days, even after putrification had started and finally when she left it nothing was left except the dried body.

Behaviour of the peripheral male : It was the usual habit of the peripheral male of the Karghena group to rush into the group and occupy the main tree whenever the dominant male was away from the main group. The peripheral male on entering the main group threatened other members of the group, particularly the adult females. On such occasions all the adult females, particularly the females with infants, and other males hurriedly climbed up the main tree and all the females on such occasions tried to remain as close as possible to each other and other males. Ultimately all the females and other males joined and chased out this male from the main tree to the road below and in such chases the females with infants took active part. The peripheral male after coming down from the tree always remained close to the main tree and tried to climb up and to regain its lost position. However, he was always on the look-out for the dominant male and retreated on seeing it. At times he was also chased out by the dominant male. Whenever he had the opportunity he moved into the territory of the main group, and occupied a position on the main tree, but soon retreated on finding the group returning with the dominant male.

At feeding time this male fed close to the main group and it slept, rested and moved at a certain distance from the main group. Whenever there was danger to the group this male also took part with the other members in defending the group.

Formation of a sub-group of the Kareilly group : One adult male was observed about half a kilometre away to the south of the Kareilly group, and usually resting on, or moving near, a big pakar tree. Two to three females of the Kareilly group at times joined this male and before returning to the main group they spent some time with this male. Probably it was the beginning of the formation of a sub-group of Kareilly group.

Acknowledgements

I am grateful to the Director, Zoological Survey of India, for providing facilities. Thanks are also due to Dr. C. H. Southwick of the Johns Hopkins University for co-operation and suggestions from time to time,

and to Drs. B. Biswas and K. K. Tiwari of Zoological Survey of India, for going through the manuscript and valuable suggestions.

REFERENCES

CHANCE, M. R. A. (1956) : Social structure of a colony of *Macaca mulatta*. *Brit. J. Anim. Behav.* **4** : 1-13.

BERNSTEIN, I. S. & MASON, W. A. (1963) : Activity patterns of Rhesus monkeys in a social group. *Anim. Behav.* **11** : 455-460.

SOUTHWICK, C. H. (1962) : Patterns of inter-group social behaviour in primates, with special reference to Rhesus and Howling monkeys. *Ann. N. Y. Acad. Sci.* **102** : 436-454.